

**A Comprehensive Methodology for  
Measuring Costs and Benefits of  
Critical Habitat Designation  
Under the Endangered Species Act**

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By

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**A Comprehensive Methodology for  
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Under the Endangered Species Act**

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## **Dedication**

I would like to dedicate this paper to my wife and daughter, without whose understanding and support this work would not be possible. They made many sacrifices that gave me the support and love that I needed.

## **Acknowledgement**

I would like to acknowledge the many people who helped with this thesis. I would like to thank Dr. Bryan Norton for suggesting this topic for this thesis, the many members of the “Lynx Team” at Defenders of Wildlife for their input, and especially Dr. Timm Kroeger and Dr. Frank Casey at Defenders. Dr. Casey provided me with the opportunity to work and Defenders and work on this thesis while Dr. Kroeger was very patient with my many questions regarding economics.

## Table of Contents

Table of Contents .....	v
List of Tables .....	vi
List of Figures .....	vii
Summary.....	viii
Introduction .....	1
Basics of the Endangered Species Act .....	2
The Listing Process.....	2
Critical Habitat .....	5
Protection.....	8
Recovery Plans.....	12
History of Critical Habitat .....	14
1978 Amendments.....	15
Prudency .....	17
Rebirth.....	20
Current Situation .....	21
Review of Economic Analysis.....	24
Methodology Used by the FWS .....	24
Current Issues in Critical Habitat Designation.....	29
Benefits? .....	30
Educational Benefits.....	32
Administrative Benefits.....	34
Conservation Benefits .....	36
Type of Economic Analysis .....	39
Economic Impacts of Critical Habitat .....	44
Secondary Benefits.....	52
Structure of Economic Analysis.....	54
Basic Methodology.....	58
Conclusions.....	67
References.....	70

## List of Tables

Table 1- Categories of potential economic impacts of critical habitat designation for species X: Generic template.....	60
Table 2- Land use/cover and ownership matrix.....	63

## List of Figures

Figure 1-The listing process.....	3
Figure 2-Number of domestic species with critical habitat, 1981 through 2002.....	19

## Summary

In recent years, critical habitat has been subject to a great deal of controversy and numerous lawsuits. Critical habitat is an integral part of the Endangered Species Act (ESA) that serves not only to protect the species and its' habitat but may also help the recovery of the species. Critical habitat has been the subject of a large number of recent lawsuits. These lawsuits arise from conservation groups, forcing the Fish and Wildlife Service (FWS) to designate critical habitat and from developmental groups, claiming that the economic analyses used by the FWS during the designation of critical habitat are faulty. The economic analyses that are currently being done by the FWS are quantifying the costs of critical habitat to the extent possible while virtually making no effort to quantify the benefits of critical habitat. This potentially biased economic analysis can skew public opinion by presenting an unbalanced result from the analysis. Therefore, this thesis presents a methodology for comprehensively identifying and quantifying, where possible, the costs and benefits of critical habitat.



## Introduction

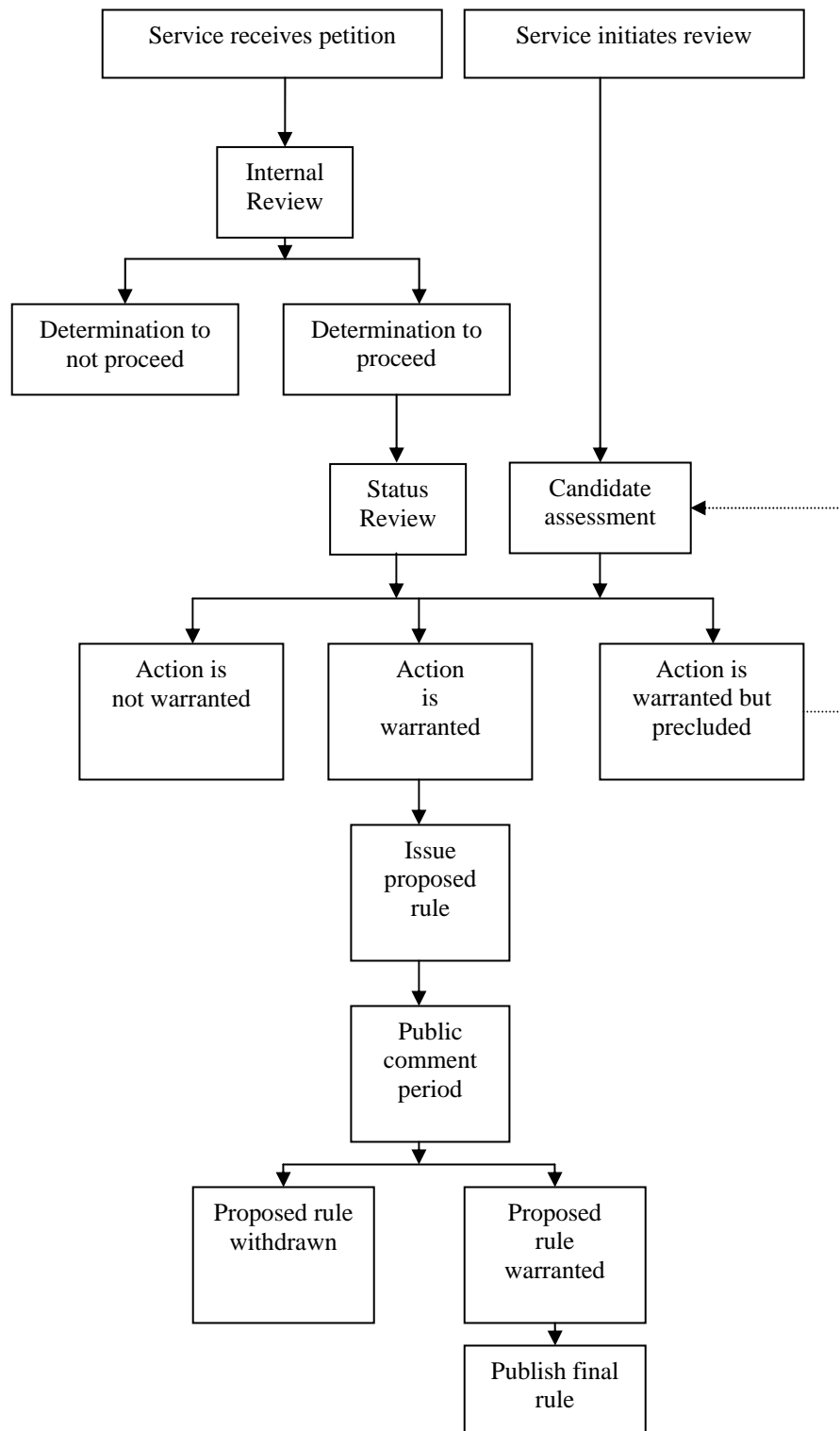
In 1973, the Congress of the United States passed the Endangered Species Act (ESA). It arose as a response to the growing concern over global losses in biodiversity. It has been estimated that as many as 40-100 species go extinct everyday worldwide. The ESA was written to slow down and eventually stop this extinction rate. It is "the broadest and most powerful law to provide protection for endangered species and their habitats" (NRC, 1995, 1). It is jointly administered by the Fish and Wildlife Service (FWS) and the National Marine Fisheries Service (NMFS). The FWS has jurisdiction over terrestrial species while the NMFS has jurisdiction over aquatic species. While this thesis recognizes the presence of the NMFS in the ESA, it will deal exclusively with the FWS. This is due to the vast majority of species falling under the jurisdiction of the FWS and the contentious history the FWS has with the ESA.

## **Basics of the Endangered Species Act**

The ESA calls for species, and in some cases sub-species and local populations, which are in danger of extinction to be listed as either “endangered” or “threatened.” The ESA defines “endangered,” the more serious of the two designations, to mean “any species which is in danger of extinction throughout all or a significant portion of its range,” excluding insects considered pests (16 U.S.C. §1532(6)). Further, the ESA defines “threatened” to mean “any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range” (16 U.S.C. §1532(20)). The list for endangered and threatened animals is found at 50 CFR 17.11 and the list for endangered and threatened plants is found at 50 CFR 17.12 (USFWS 002). Once a species becomes listed, it gains tremendous protection from the remainder of the ESA.

### **The Listing Process**

The listing process is ideally a straightforward process (Fig. 1). Throughout the process, the Secretary must make the decision “solely on the basis of the best scientific and commercial data available” (16 U.S.C. §1533(b)(1)(A)). First, a petition is filed to list a species. Anyone, including private citizens and organizations, can file the petition to list (Snape, 1995). From the receipt of the petition, the Secretary has 90 days to decide



Source: GAO analysis of U.S. Fish and Wildlife Service data

**Figure 1. The Listing Process**

whether the petition has enough information to determine whether a formal review is necessary. If a formal review is necessary, the Secretary has twelve months to decide whether listing is “warranted, not warranted, or warranted but that the ‘immediate proposal’ is ‘precluded’ by pending proposals of other species” (Houck, 1993). This classification, “warranted but precluded” was granted to the FWS in order to give them the latitude to focus on species with greater need (Houck, 1993). If the proposal is found “not warranted” the species is no longer considered for listing. If the proposal is found “warranted but precluded,” the species is not listed at that time but is intended to be listed at the first possible moment. As of 1993, some species had been “warranted but precluded” for sixteen years (Houck, 1993). If the proposal is found “warranted” the proposal is published in the Federal Register as a proposed rule, the Secretary notifies the affected state and local governments, places a summary of the proposal in a local paper, and holds a public hearing, if necessary (Snape, 1995). The Secretary has a number of factors to help with the decision of whether to list the species or not. If any of the following criteria are met, then listing usually occurs:

- “the present or threatened destruction, modification, or curtailment of the species’ habitat or range;
- over utilization for commercial, recreational, scientific, or educational purposes;
- disease or predation;
- the inadequacy of existing regulatory mechanisms; or
- other natural or manmade factors affecting the species’ survival” (USFWS, 2002).

After publishing the proposed rule in the Federal Register and local papers, the Service accepts comments, usually in a 60 day period. After 12 months from the listing proposal, the Secretary has three options. First, if the evidence supports it, a final rule is published. If the final rule is approved, it takes effect after 30 days and the species becomes listed. Second, the proposal may be withdrawn because the biological information does not support the listing. Third, the proposal can be extended for six months because there is serious disagreement about the biological information or "biological appropriateness of the listing" (USFWS, 2002). After the six months, the Secretary must make a decision based upon "the best scientific information available" (USFWS, 2002). Once a species does become listed, its status is reviewed every five years.

There is also an emergency listing process that can bypass the formal review process. The Secretary must publish a notice of why the emergency listing is necessary and notify the state and federal conservation agencies affected by the listing. These emergency listing expire after 240 days unless the Secretary decides that formal listing is necessary (Snape, 1995).

### **Critical Habitat**

Concurrent with listing the species as "endangered" or "threatened," the FWS is mandated to designate "critical habitat." If it is

not possible to designate critical habitat at the time of listing, FWS is granted a one year extension to designate. At the end of the year, the FWS must make a designation based on the data that they currently have (Shingleton, 2003). "Critical habitat" is defined by the ESA to be

"(i) the specific areas within the geographical area occupied by the species, at the time it is listed in accordance with the provision of section 4 of this Act, on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management consideration or protection; and  
(ii) specific areas outside the geographical area occupied by the species at the time it is listed in accordance with the provision of section 4 of this Act, upon a determination by the Secretary that such areas are essential for the conservation of the species" (16 U.S.C. §1532(5)(A))

Thus, critical habitat is not only the habitat that the species is currently occupying (i) but also the habitat that the species is not occupying but that is important for the "conservation" of the species (ii). "Conservation" means "the use of all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to this Act are no longer necessary" (16 U.S.C. §1532(3)). Thus, critical habitat is the habitat that the species is currently occupying but also that habitat that is unoccupied

but that is needed for the recuperation and delisting of the species (Snape, 1995).

Critical habitat is supposed to be designated

“on the basis of the best scientific data available and after taking into consideration the economic impact, and any other relevant impact, of specifying any particular area as critical habitat. The Secretary may exclude any area from critical habitat if he determines that the benefits of such exclusion outweigh the benefits of specifying such area as part of the critical habitat, unless he determines, based on the best scientific and commercial data available, that the failure to designate such area as critical habitat will result in the extinction of the species concerned” (16 U.S.C §1533(b)(2)).

In contrast to the listing of a species, critical habitat is designated after taking into consideration economic factors. While the ESA does not explicitly state that a cost-benefit analysis will be done, the language of the statute “may exclude...if...the benefits of such exclusion outweigh the benefits of specifying such area” basically calls for one. Critical habitat is supposed to be designated when the species is listed. However, this has rarely been the case (Houck, 1993). The FWS has generally refused to designate critical habitat, claiming it was not “prudent” (Sinden, forthcoming). For instance, as of June 2003, only 33% of listed species have had critical habitat designated (GAO, 2003). This point will be discussed later.

## Protection

Once the species is listed, there are two basic protections offered by the ESA. First, when any federal agencies takes any action, which includes funding, permitting, etc of private actors, then they must consult with the FWS to ensure that they do not “jeopardize” the species or destroy or “adversely modify” its habitat. The second is that it becomes illegal for any actor, whether public or private, to “take” the species.

The first protection the Act offers is federal consultation. Under Sec. 7 of the ESA, all federal agencies must “consult” with the FWS to ensure that their actions do not “jeopardize the continued existence of any” listed species or “result in the destruction or adverse modification of” critical habitat (16 U.S.C. §1536). While “jeopardy” is not defined in the Act, the FWS defines it to mean any activity that would “reduce appreciably the likelihood of both the survival and recovery of a listed species” (50 CFR 402.02). Similarly, the FWS defines “destruction or adverse modification” to mean an “alteration that appreciably diminishes the value of critical habitat for both the survival and recovery of a listed species” (50 CFR 402.02). It is important to note that both “jeopardy” and “adverse modification” are defined in terms of “both survival **and** recovery” (emphasis added). Again, this will be discussed later.

When a federal agency, known as an “action agency,” carries out, funds, or permits an action they must consult with the FWS to determine



whether they are going to “jeopardize” the species itself or “adversely modify” its critical habitat, if any has been designated. This is part of the “informal” consultation process. If the proposed action will not affect any endangered species, then there is no need for any more consultations and the action may continue. However, if an endangered species is affected, then the “formal consultation” begins. This is a written request from the action agency to the FWS to begin section 7(a)(2) consultation (50 CFR 402.02). The FWS, along with the action agency, then conduct an investigation to determine what effect the action will have on the endangered species and its’ critical habitat. After the investigation, the FWS then issues a biological opinion, which is the formal statement of whether jeopardy or adverse modification will take place. Generally, if the biological opinion determines that jeopardy or adverse modification is found, then that federal action is modified so that there is no, or at least less of, an impact. The FWS and the action agency work together to provide “reasonable and prudent alternatives” so that there will be less of an impact from the proposed action (Snape, 1995).

For the vast majority of cases, the action is allowed to continue, with modifications. From 1987 and 1991 there were 73,560 consultations. Only 131 determined that there was potential jeopardy (Rachlinski, 1997). In addition, only 18 Federal projects were not allowed to proceed (Rachlinski, 1997). If no alternative is found, then the action agency can

appeal to a committee known informally as the “God Squad” (Sinden, forthcoming). The “God Squad” was created by the 1978 Amendments and consists of “the Secretaries of the Interior, Agriculture, and Army, the Chairman of the Council of Economic Advisors, the Administrator of the EPA, the Administrator of the National Oceanic and Atmospheric Administration, and an individual nominated by the governor of the affected state and appointed by the President” (Peterson, 1999, 487). This committee has the power to grant exemptions from the ESA. If 5 of the 7 members approve, then the species is exempted. While the biological opinion is not binding on the action agency, the Courts have given deference to these opinions and the federal agencies risk citizen suits if they continue with an unmodified project. The Supreme Court sees the biological opinions as “virtually determinative” (Sinden, forthcoming). If the biological opinion does find that there are impacts on the species, the Agency can issue an incidental take permit to the action agency. This permit recognizes that the project will not impact the species as a whole but that a small number of individuals might be “taken,” or “harassed, harmed, injured, or killed” (Snape, 1995).

The second protection the Act offers is the prohibition on “take.” Section 9 of the ESA prohibits the “take of any...species within the United States” (16 U.S.C. §1538). “Take” is defined by the Act to mean “to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to

attempt to engage in any such conduct (16 U.S.C. §1532(19)). Further, the term “harm” has been defined by the FWS to mean any act that kills or injures the species. This “act may include significant habitat modification or degradation” (50 CFR §17.3). This use of the term “harm” to include modification of habitat has been upheld by the Courts. This interpretation has been upheld by the Supreme Court in *Babbitt v. Sweet Home* (115 S. Ct. 2407). Thus, the species’ habitat is protected not only by critical habitat but also by “harm.” However, “harm” only applies to habitat where the species actually is located; it does not include habitat that is unoccupied by the species but that is needed by the species for recovery. This unoccupied habitat is only protected by critical habitat.

From the protections offered by both “take” and “harm,” it becomes illegal to do anything that negatively affects an endangered species. This prohibition applies to both federal and other public agencies but also to private citizens and corporations, in the case of animal species. For endangered plant species, the protection does not extend to private citizens and corporations. This is the reason why many landowners do not like the ESA (NESARC, 2003). They feel that it restricts the use of their private property.

However, it is still possible to carry out actions that can “take” a species. Section 10 of the ESA offers these options. It has exemptions for certain scientific practices that will benefit the species (Sec. 10(a)(1)(A)),

native Alaskans for subsistence purposes (Sec. 10(e)(1)), or if a "conservation plan" is enacted (Sec. 10(a)(2)(A)). These plans, known as habitat conservation plans (HCP's), involve a written agreement between the applicant and the FWS that allows the applicant to incidentally take a species in any normal activity the applicant carries out if they agree to certain mitigation strategies, such as setting aside habitat. The landowner not only gets the incidental take permit, they also get assurances from the FWS that they will not be subject to any additional regulations if another endangered species is found on their land or if the management plans for the current endangered species changes. This assurance is known as the "no surprises" policy (Noss, et al, 1996). These HCP's were added to the ESA in 1983 (Frampton, 1996). HCP's were generally not used much until the Clinton Administration, which used the plans to increase collaboration among people and organizations impacted by endangered species (Frampton, 1996).

### **Recovery Plans**

The final component of the ESA is recovery plans. They were first required by the 1978 amendments (NRC, 1995). After a species has become listed, a recovery plan is mandated to be developed. Currently, approximately 80% of listed species have recovery plans (Taylor, 2003). These plans are designed by the FWS to include,

“ (i) a description of such site-specific management actions as may be necessary to achieve the plan’s goal for the conservation and survival of the species;  
(ii) objective, measurable criteria which, when met, would result in a determination, in accordance with the provisions of this section, that the species be removed from the list; and  
(iii) estimates of the time required and the cost to carry out those measures needed to achieve the plan’s goal and to achieve intermediate steps toward that goal” (16 U.S.C. §1533 (f)(1)(B)).

Thus, recovery plans are implemented with specific goals and objectives that will promote the expansion and recovery of the species.

While recovery plans make sense theoretically, there have been numerous problems with them. The NRC identifies the major problem as the absence of basic scientific knowledge (1995). Because much of the basic scientific knowledge is lacking about the particular species, it is difficult to provide clear, concise objectives based on this science. While most listed species have recovery plans, if the objectives are based on unknown scientific data, then the plans might be ineffectual.

## History of Critical Habitat

Historically, critical habitat has been a controversial issue. The ESA itself gives critical habitat the same protections that are given to the species themselves (Yagerman, 1990). Congress recognized the importance of protecting the habitats on which the species depended. If the species' habitat is not protected, then it is increasingly likely that the species will not recover and, eventually, go extinct. The Act states that "the purposes are to provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved" (16 U.S.C. §1531(b)). Congress termed this habitat "critical habitat."

Unfortunately, the implementation of critical habitat by the FWS has not been ideal. The original 1973 ESA did not define what critical habitat was, nor did it construct a procedure for delineating critical habitat. It just stated that protecting critical habitat should be a goal of the United States. Congress delegated this responsibility to the FWS. The FWS was able to regulatory define what habitat was "critical" (Yagerman, 1990). This gave the agencies "broad discretion" (Snape, 1995) The FWS then decided to define critical habitat to include habitat that was necessary for "expansion or recovery" of the species (Yagerman, 1990).

## 1978 Amendments

However, Congress decided that this definition was too broad and chose to narrow the definition of “critical habitat” statutorily in the 1978 Amendments. When the ESA was passed, most legislators did not realize what they were getting. They didn’t realize what was biologically necessary for preservation of species. “The original ESA likely failed to define ‘critical habitat’ because congressional policy makers did not fully anticipate the political ramifications when ‘habitat’ is construed in a biologically meaningful way” (Yagerman, 1990, 830). The 1978 Amendments are very important in that they set the role for critical habitat. These Amendments responded, for the most part, to the snail darter controversy (Houck, 1993).

The snail darter is a three -inch fish that was listed by the FWS as endangered in 1975 (Peterson, 1999). The only known habitat for the darter coincided with the Tellico Dam which was being constructed by the Tennessee Valley Authority (TVA). The dam was being built in the snail darters’ designated critical habitat (Percival, 2000). The Environmental Defense Fund brought suit against the TVA to halt the construction of the dam, which was 80% complete (Reisner, 1987). Eventually, the suit made it all the way to the Supreme Court, who held for the conservation group and halted the construction of the dam. Many members of Congress felt that this was a misinterpretation of the ESA (Peterson, 1999). In response to

this controversy, Congress added the above definition of critical habitat and added that “except in those circumstances determined by the Secretary, critical habitat shall not include the entire geographical area which can be occupied by the threatened or endangered species (16 U.S.C. §1532(5)(b)).

The 1978 Amendments also included the addition of economic considerations for critical habitat designation. Congress was afraid that small, esoteric species could shut down other public works projects. Quoting Sen. James Sasser (D-Tenn.), Peterson states, “I do not believe that most of the Members who voted for that bill ever intended it to be used to halt water resources development” (1999, 486). The 1978 Amendments also fashioned the procedure for critical habitat designation. It created the schedule that the FWS must follow and allowed for the consideration of economic impacts. Thus, the scope of critical habitat was limited (Yagerman, 1990). Also, those species listed from 1973 to 1978 are not required to have critical habitat. This means that some of the earliest, most endangered species do not have critical habitat. An example of this is the grizzly bear (Yagerman, 1990).

Finally, the 1978 Amendments also introduced the “God Squad” as another escape clause for exempting species. It is interesting to note that the “God Squad” was convened for the snail darter and it was determined **not** to exempt it from the ESA. But perhaps the most



detrimental aspect of the snail darter controversy was that FWS decided to not list species or designated critical habitat if they could get away with it. "The snail darter controversy had several consequences. First, FWS became more cautious about listing species, using its discretion to avoid the mandate of section 4. ...In the wake of Tennessee Valley Authority v. Hill, FWS began to exercise its discretion to avoid controversy, even if that meant circumventing section 4" (Peterson, 1999, 486). The FWS decided to use the "warranted but precluded" category to delay listing (Houck, 1993). Because there was such a backlog of species waiting to become listed, the FWS used this to justify not listing species. They claimed they just did not have the resources.

### **Prudence**

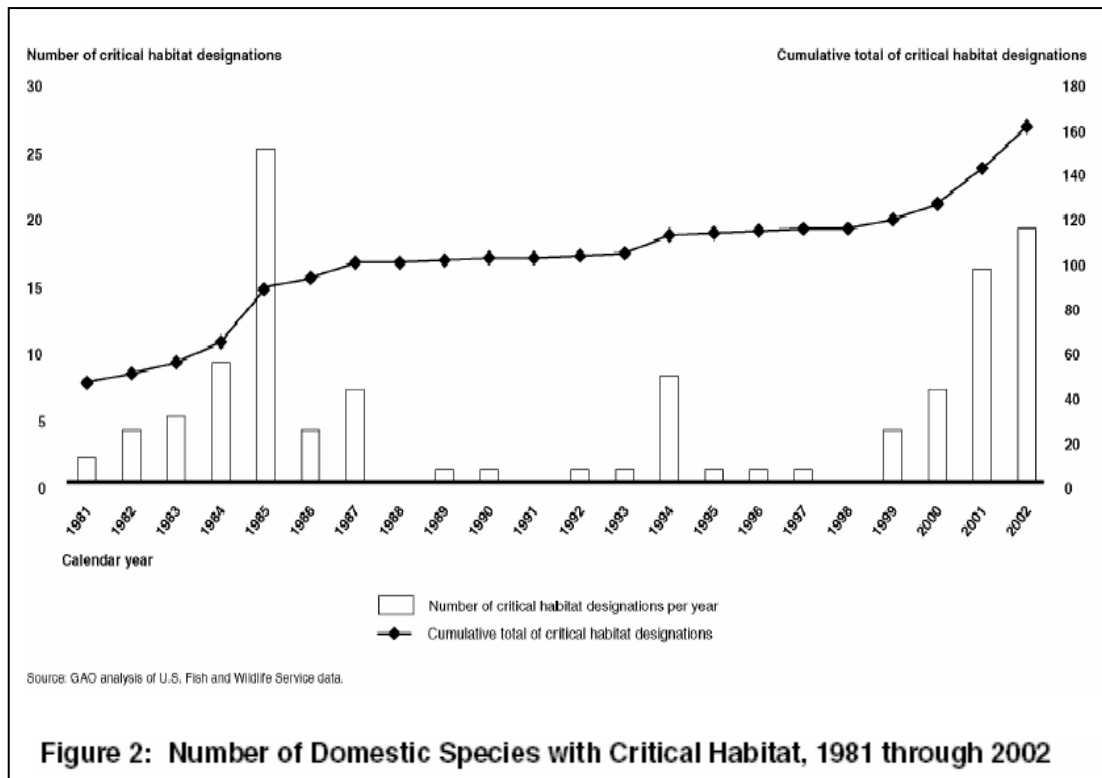
In 1986 the Department of the Interior (DOI) introduced regulations that drastically changed critical habitat. DOI altered the definition of "recovery" so that "adverse modification" and "jeopardy" mean basically the same thing. Both of the terms were defined in the language of both survival and recovery of the species (Houck, 1993). Further, because of the word "both" in order for an action to be found unlawful, it had to affect recovery **and** survival. If it only affected recovery and not survival, then it was permitted (Houck, 1993). Because of these definitions, the FWS no longer saw any benefit to critical habitat above jeopardy and, in the majority of cases, decided that designating critical habitat was "not

prudent.” The FWS saw the use of “prudence” as an escape clause, a way to legally not designate critical habitat.

However, this was contrary to Congressional intent. Congress intended for “prudence” to give some latitude to the FWS, to give them some freedom for stronger mandates (Patlis, 2001). Unfortunately, FWS took that latitude and greatly expanded it. Whereas Congress intended “prudence” to be the exception, used only in “rare circumstances” the FWS used it as the rule (Patlis, 2001). As Hicks states, “the 1986 regulations, although introducing seemingly subtle changes, are a clear attempt to restrict the critical habitat protections of the ESA” (2000, 4). Basically, the FWS did away with many benefits of critical habitat designation. Because of this, they then decided not to designate it. As Hicks states, “Historically, this protection (critical habitat) has had enormous practical consequences, but subsequent to the Department of Interior’s 1986 amendments to regulations implementing section 7 of the ESA, it is doubtful that critical habitat has any practical value.” While the regulations did strip a number of benefits from critical habitat, it did not strip them all. Some of the other benefits of critical habitat are the information requirements it has, the Courts deference to critical habitat, and requirement of federal consultations. These will be discussed below.

Because of the use of prudence, critical habitat is not designated in the large majority of cases. As of June 2003, there were 1,263 listed

species with only 417 (33%) having critical habitat designated (GAO, 2003). Throughout the late 1980's and majority of the 1990's, critical habitat was hardly ever designated. This is illustrated by Figure 2.



As can be seen, the number of critical habitats designated is very low. Even in 1985, with approximately 25 designations, there were approximately 60 species listed (GAO, 2003). Thus, even in an active year, less than half of the listings are accompanied with critical habitat designations.

## Rebirth

In 1997 the FWS was challenged by conservation groups in Court over its use of “prudence.” In *Natural Resources Defense Council v. U.S. Department of the Interior* (113 F.3<sup>rd</sup> 1121), the circuit court ruled against the “no benefit” rationale and against the use of “prudence” (Patlis, 2001). Because of this ruling, conservation groups are now suing the FWS over critical habitat designations. In almost every case, the Courts have ruled for the conservation groups, “requiring the Service to designate critical habitat, rejecting either the ‘not determinable’ or the ‘not prudent’ findings” (Patlis, 2001, 183). Because of this, there has been a rebirth in critical habitat designations. This can also be seen in Fig. 2, beginning in 1999.

However, these designations have come under attack from the other side, from private landowners. They claim the economic analyses performed for the critical habitat designations are flawed. Because the FWS does not see any benefit from critical habitat, they also did not see any economic impact. In *New Mexico Cattle Growers Association (NMCGA) v. U.S. Fish and Wildlife Service* (248 F. 3d 1277), the Tenth Circuit held against the FWS’ economic analysis. They invalidated the “baseline approach” that the FWS had used (Sinden, forthcoming). The baseline approach examined only the economic impacts above and beyond the impacts from listing. Because the FWS saw no additional benefit of critical

habitat above that of listing, it did not find any impact. The Tenth Circuit Court “held that the language of the ESA clearly required consideration of economic impacts, and under FWS’ baseline method the consideration of economic impacts, the ESA was rendered meaningless” (Shingleton, 2003). The court concluded that the economic analysis must look at all of the impacts of critical habitat, even if it is partly attributable to other things, like listing. Basically, the Tenth Circuit required that the FWS must conduct a formal economic analysis, not just an empty gesture. In response to this decision, the FWS adopted a double baseline approach. This second baseline measures impacts that are caused by both critical habitat designation and listing (Sinden, forthcoming). Thus, in the current economic analyses performed by the FWS, the original baseline, the impacts of critical habitat designation only, remain in the analysis but are augmented by this second baseline.

### **Current Situation**

The current situation is not a hopeful one. The past few years have been very litigious. Both environmental groups and private landowner groups have been suing the FWS for either not designating critical habitat on schedule or for doing poor economic analyses. Because of this, the FWS claims that they do not have the budget to carry out the many tasks of the ESA. The critical habitat program within the FWS has always had an incredible small budget (Houck, 1993). Because there is this budget

shortfall, the FWS claims that there is not enough money to designate critical habitat. Craig Manson, Assistant Secretary for Fish and Wildlife and Parks, Department of the Interior, stated, "the system for designating critical habitat is broken. A process that provides little real conservation benefit consumes enormous agency resources and imposes huge social and economic costs" (Manson, 2003).

However, this is very possibly due to the consistent under funding the listing program receives. A recent internal analysis conducted by the FWS found that it would cost approximately \$153 million to administer the backlog of listing and critical habitat designation. This year, the current administration requested \$12.3 million (Vickery, 2003). In fact, after Congress appropriated this amount, the FWS was invited by Congress to request more money but choose not to (Endangered Species Coalition, 2003). Unfortunately, this is not a new occurrence. While appropriations have always been low, Interior has generally not requested a budget increase (Houck, 1993). In fact, Interior has been aggressive in resisting increased funding. Houck states,

"the Nature Conservancy proposed the Interior's 1990 budget for listing endangered species be increased from \$3 million to \$15 million-a minor sum in most federal budgets-a sum that would allow Interior to list an estimated 250 species per year. Interior objected, stating that an increase for 'this lower priority activity' ran counter to the goal of reducing the federal deficit, more disturbingly, that 'any significant increase in the number of species being listed each

year...would require a commensurate increase in funding for recovery, consultations, law enforcement and related activities'. Voila. The problem is not money if one refuses to ask for money" (Houck, 1993).

It should be noted that thirteen years later, the level of funding still has not reached the level recommended by the Nature Conservancy. The fact that Interior would refuse to increase funding provides evidence for their likely disdain for the critical habitat program. Because they do not have the resources necessary to complete listing and critical habitat designation according to the schedule, they are open to litigation, which then leads to more litigation, which takes more money. It is a classic Catch-22 that has lead to the current situation.

## **Review of Economic Analysis Methodology Used by the FWS**

Before the New Mexico Cattle Growers case, the FWS used a “baseline approach” that analyzed the difference in the world with and without critical habitat. After this approach was invalidated, the FWS switched to the double baseline approach. This is the same analysis that the FWS had been conducted, with the addition of another baseline. The baseline that is added is the “without section 7/with section 7” baseline (Industrial Econ., 2002). This baseline determines the impacts that arise from listing of the species. The “without section 7” situation is the state of the world without listing the species. This would include any applicable local, state, or federal laws, regulations, and ordinances (Industrial Econ, 2002). The “with section 7” situation analyzes activities that would change after the species has been listed. This baseline is used to determine the upper-bound of the effects of critical habitat designation. It should capture all of the effects of listing and designating critical habitat. As a report by Industrial Economics notes,

“By defining the upper-bound estimate to include both jeopardy and adverse modification provisions of section 7, the analysis recognized that, in some cases, it may be difficult to differentiate between the two sources of impact. This approach is adopted in order to ensure that any critical habitat impacts that may occur co-extensively with the listing of the species (i.e., jeopardy) are not overlooked in the analysis” (Industrial Econ. 2002, paragraph 25).



The second baseline is the original baseline the FWS used for the economic analyses, the “with and without critical habitat” baseline. The “without critical habitat” situation identifies the state of the world where the species is only listed while the “with critical habitat” situation identifies those impacts that arise from designation of critical habitat. Because there will be fewer impacts from designating critical habitat than from listing **and** critical habitat, this second baseline represents that lower-bound estimate of the analysis. As previously mentioned, it is very difficult to separate the activities that arise solely from listing the species from those that arose solely from the designation of critical habitat. Therefore, Industrial Economics argues that it is best to get a range.

There are a number of controversies in the way that the FWS performs their economic analysis. First, although the language of the ESA does not specify the use of a cost-benefit analysis to the economic analysis used, that is what the FWS has traditionally used. The costs of designating critical habitat are measured and weighed against the benefits of critical habitat designation. The costs of the critical habitat designation would be equivalent to the “benefits of exclusion” while the benefits of critical habitat would be the “benefits of specifying.” Second, many of the economic analyses that have recently been performed seem to be heavily biased towards the costs, quantifying many costs and rarely quantifying benefits (Industrial Econ., 2000, 2002). For example, in

the analysis done for the Mexican spotted owl (*Strix occidentalis lucida*), there are a total of 51 pages, excluding references. There are a total of less than two pages discussing benefits (Industrial Econ, 2000). While this fact alone does not necessarily bias the analysis, it does give an indication of what impacts the FWS are focusing on. In addition, the fact that the benefits, unlike the costs, were not generally quantified can add an additional bias towards the costs (Sinden, forthcoming).

While the FWS has typically not tried to quantify benefits, there have been two recent occurrences of the FWS attempting this. Unfortunately, they have not had much luck. In a recent analysis for the Gulf Sturgeon, in July, 2002, the FWS made an attempt to quantify benefits but eventually concluded that it is too difficult to “fully describe and accurately quantify the benefits of the designation” (Sinden, quoting Gulf Sturgeon draft economic analysis). Because of these difficulties, the FWS states that benefits should not be quantified but maintained in biological terms and then weighed against quantified costs. Additionally, the FWS has made an attempt to quantify a non-use value for an endangered species. In the recent draft economic analysis for the Pygmy Owl, they performed a “benefits transfer” to attempt to get a numerical non-use value for the owl (Industrial Economics, 2002). Unfortunately, it is difficult to attribute all of this value to critical habitat. While critical habitat is an important

conservation strategy, only some of this non-use value for the species itself can be attributed to critical habitat.

In addition to this general lack of quantification of benefits, there seems to be an increasing tendency to find and quantify any type of cost possible. For example, most of the first economic analyses performed by the FWS had federal consultation costs as their main component. In more recent analyses, more diverse costs have been added (Industrial Econ., 2002). Thus, the quantified costs of critical habitat appear to be increasing while the unquantified benefits of critical habitat remain static. Because the benefits of the critical habitat are not quantified, it can be difficult to empirically compare them to the costs. If the FWS is overestimated the true costs of critical habitat designation or is underestimating the true benefits of critical habitat designation, this type of unbalanced analysis can lead to less critical habitat being designated than is optimal. These benefits of critical habitat will be discussed in the following section.

Further, if the Secretary of the Interior is under political pressure to not designate a certain area critical habitat, then it can be very simple to argue that the quantified costs of designating critical habitat outweigh the unquantified benefits. This gives the Secretary a great deal of leeway when determining exclusions from critical habitat. As Patlis notes, "as currently written, the critical habitat provision is a startling section which is

wholly inconsistent with the rest of the legislation. It constitutes a loophole which could readily be abused by any Secretary of the Interior who is vulnerable to political pressure, or who is not sympathetic to the basic purposes of the Endangered Species Act" (2001, 8).

## Current Issues in Critical Habitat Designation

There are a number of issues surrounding the designation of critical habitat and the use of economic analysis. The first revolves around the question: "does critical habitat provide any benefit to the species?"

Based on the statements of the FWS given below and some statistical studies, the answer is a definitive, "yes" (USFWS(b), 2003, Taylor, et al. 2003, USFWS(b), 2000, Rachlinski, 1997).

A second issue involves the type of economic analysis performed. When the FWS conducts their analyses, they generally do not attempt to quantify benefits. This can bias the final designation of critical habitat by overstated the total net cost of the designation (Sinden, forthcoming). Therefore, in order to avoid this bias, the FWS should either forgo a formal economic analysis for a rough comparison of costs and benefits (as Sinden argues) or it should make a concerted effort to quantify both costs and benefits (as this thesis argues).

Third, and perhaps most important, what are the economic impacts of critical habitat? What are the costs and benefits to society of designating critical habitat? While there are transaction costs and project modifications associated with critical habitat, there are also a number of "secondary benefits", such as avoided cost of public infrastructure,

maintenance of option value for the species and habitat, and avoided loss of ecosystem services.

Finally, what should the structure of the economic analysis be?

Currently, the FWS uses a double baseline which not only measures the economic impact of critical habitat but also the impact of listing. This is contrary to the intent of Congress; only critical habitat designation can consider economic impacts. Therefore, a single baseline should be used.

### **Benefits?**

The most basic question to ask about critical habitat is: are there any benefits? If there are no benefits, then it is easy to argue that critical habitat is a waste. There would be no reason to designate critical habitat because it does not benefit the species. If there are net benefits, then critical habitat should be designated for each species. The FWS has historically denied that there are any major benefits while most conservation organizations have consistently stated that there are. This has been the root of the litigation surrounding critical habitat. Because FWS generally argues that critical habitat is a waste of time, personnel, and funding, they have attempted to bypass critical habitat designation for most species. Meanwhile, many conservation organizations feel that there are benefits, so they sue the FWS to try to force them to designate. Therefore, if this question could be answered, it would be a step towards a less litigious process of critical habitat designation.

It should be noted that there are different kinds of benefits that critical habitat provides. There are educational, administrative, and conservation benefits. Educational, or informational, benefits arise when, through the listing and critical habitat designation process, the public is made aware of the characteristics and habitat needs of the species.

Administrative benefits are those that arise from activities that must be carried out by the federal government. For example, when a federal agency must consult with the FWS to determine whether an endangered species is harmed by a federal activity, this can lead to a benefit to the species. It might protect the species from potential harm. While administrative benefits arise from listing a species, they also arise from critical habitat designation.

Conservation benefits would be ones that contribute directly to the recovery of the species. An example of a conservation benefit would be where certain activities are modified in response to critical habitat designation. When critical habitat is designated, certain activities, like grazing and timbering, must be altered. These modifications of activities benefit the species by (hopefully) improving the habitat.

The FWS accepts that critical habitat provides educational and administrative benefits but claims that it provides no additional conservation benefits above listing (USFWS(a), 2000). In addition, the FWS, in the economic analyses for critical habitat, generally acknowledges

other benefits of species preservation, such as existence value, recreational use value, and certain ecosystem services (Sinden, forthcoming). However, the FWS is “hesitant” to assign these benefits directly to critical habitat (Sinden, forthcoming). Because they do not believe that critical habitat contributes to the conservation of the species, then these other benefits cannot be applied to critical habitat.

### **Educational Benefits**

Educational benefits of critical habitat are an important aspect of critical habitat designation. While discussing the critical habitat designation for the Spaldings Catchfly, *Silene spaldingii*, the FWS states that critical habitat designation “may also provide educational or informational benefits” (USFWS(b), 2000, 21712). During the listing and critical habitat designation process, the FWS provides information about the species and its habitat to the public hoping to get public response and comments. This information can provide the public with important information that they can use to have more informed discussion about the particular species. Thus, educational benefits are not exclusive to critical habitat, they also occur during the listing process. These processes give the public important information about characteristics and needs of the species and helps delineate what type of habitat is needed. It is usually important to get the local affected population involved in the critical habitat designation. If the public is not involved, then the conservation



benefits of critical habitat can possibly be sabotaged. For instance, in the case of charismatic megafauna, like gray wolves, if the public is not involved then, in certain situations, it is possible for the “shoot, shovel, and shut-up” strategy to become established.

According to Wilcove, et al, “more than half of the species in the U.S. that are protected by the Act have at least 81% of their habitat on non-federal land. Between a third and a half of the protected species do not occur at all on federal lands” (1996, 2). In addition, “for species found entirely on private property, only 3% are improving, and the ratio of declining species to improving species is 9 to 1” (Wilcove, et al. 1996, 2). Because of the number of endangered species that occur on private lands, it is imperative to get the local population involved. They need to know when they have an endangered species on their land and they need to know what they can do to help with recovery. Yaffee, quoting a local business owner, states “people were dying for information...to do the right thing. They were trying to make their wrongs right” (2000, 26). The FWS has generally recognized this educational benefit of critical habitat. They state that critical habitat gives,

“benefits to the species by informing the public (via newspaper articles, newspaper notices, public meeting, public hearings, etc.) of areas that are important for species recovery and where conservation action would be most effective. Designation of critical habitat helps focus conservation activities for a listed species on the areas that contain the physical and

biological features that are essential for conservation of that species, and alerts the public and land-managing agencies to the importance of those areas" (USFWS(b), 2003).

Another aspect of the educational benefit is the certainty that it can provide. Local landowners are anxious to know whether their land has been designated or not. This information will let them know what actions they need to take, if any. During the comment period for the designation of critical habitat for the Alabama Sturgeon, the FWS "received numerous comments from both proponents and opponents of the species listing that favored designation of critical habitat" (USFWS(a), 2000). This indicates that, at least for the Alabama sturgeon, local people wanted certainty about critical habitat.

### **Administrative Benefits**

Another class of benefits the FWS recognizes is administrative benefits. Like educational benefits, administrative benefits arise from both listing and critical habitat designation. There are two types of administrative benefits. The first administrative benefit occurs when a proposed federal action is changed or modified due to the consultation process. If a proposed action is believed to harm or adversely affect critical habitat, the action must be changed to ensure that the habitat is not harmed. Thus, if there is both critical habitat and the species are present, then the administrative benefits cannot be attributed solely to the

species or to critical habitat. However, if there is no species present, the benefit can be attributed solely to the presence of critical habitat. The FWS recognizes that “section 7 consultation might be triggered only if critical habitat is designated” (USFWS(a), 2000, 26457). Therefore, by protecting habitat that is currently unoccupied, critical habitat can contribute to the recovery and expansion of endangered species.

An additional type of administrative benefit is the deference that courts give to critical habitat. In *Catron County Board of Commissioners v. United States Fish and Wildlife Service* (75 F.3d 1429 (10<sup>th</sup> Cir. 1996)), the court held “that ESA procedures did not displace NEPA requirements, and that actual impact does flow from a CHD” (Shingleton, 2003). Shingleton states, “Catron County established the significance of critical habitat designations and indicated that the Tenth Circuit Court of Appeals would not view them as an ineffectual addition to the listing process, but rather as an additional measure of protection that would have substantial impacts”. In a number of cases, Courts will not stop a proposed activity unless there is critical habitat present. For example, during the snail darter controversy, the “Supreme Court relied explicitly on the designation of critical habitat for the Snail Darter to enjoin a federal dam” (Houck, 1993, 309).

Unfortunately, while the FWS recognizes the presence of these benefits, they do not believe that these benefits are very important.

When making general statements about critical habitat, the FWS generally states that there are no benefits of critical habitat designation. When the FWS are making particular statements about specific critical habitat designations, they admit to educational and administrative benefits. This possibly indicates that the FWS does not think that these benefits are important enough to contribute to the recovery of the species.

### **Conservation Benefits**

The third class of benefits of critical habitat is conservation benefits. Traditionally, the FWS feels that critical habitat provides little or no conservation benefit to the species. They have stated this many times, from the beginning of the ESA (USFWS(a), 2003). The FWS states that critical habitat is redundant, duplicating protections offered by listing. They claim that "in most circumstances, the designation of "official" critical habitat is of little additional value for most listed species, (and) it consumes large amounts of conservation resources" (USFWS, 2002). Craig Manson, Assistant Secretary for Fish and Wildlife and Parks, has testified before the Subcommittee on Fisheries, Wildlife, and Water of the Senate Committee on Environment and Public Works, that critical habitat does nothing to improve species conservation. In May 2003, the FWS published a document "Critical Habitat-Questions and Answers" where they answered questions regarding critical habitat. In this document, the FWS

state that “designating critical habitat for species already on the endangered species list provides little conservation benefit to species” (USFWS(a), 2003).

Unfortunately, there have not been many studies to analyze whether critical habitat encourages recovery of the species. Two of these studies were done by Rachlinski and Taylor, et al. These studies analyzed FWS ESA progress reports. These progress reports provide information to Congress on the progress of the ESA. The reports give basic information on numbers of the ESA program, such as how many species are listed, how many species have critical habitat, and determines how many species are “improving,” “stable,” and “declining” (Taylor, 2003). Increases in the number of species in the “improving,” and to an extent the “stable” category, would indicate that the ESA is working (Rachlinski, 1997).

The Rachlinski study used the reports from 1989-1990, 1991-1992, and 1993-1994. He conducted a statistical analysis determining how different aspects of the ESA, such as critical habitat, recovery plans, and length of time listed, affected the status of the species. Rachlinski determined that critical habitat shifted species from “declining” to “stable.” While this trend was only marginally significant, it still shows that critical habitat is effective in improving species. Rachlinski states, “each aspect of the Act’s protection-listing, *designating critical habitat*, and adopting a

species recovery plan-benefits listed species" (emphasis added) (1997, 383).

The second study is one that has been recently released by Taylor, et al. Similar to the Rachlinski study, it also finds that critical habitat does indeed provide additional conservation benefits above simply listing the species. It analyzes the three most recent progress reports, two given to Congress in June of 2003 and the third given in 1999. The reports are from 1995-1996, 1997-1998 and 1999-2000. Their primary finding is that critical habitat is "strongly and positively correlated with improving trend in all three reports" (Taylor, 20003, 3). Further, in the 1995-1996 study, critical habitat was negatively correlated with declining trend. In the other two reports, there was no correlation between critical habitat and declining trend. Taylor, et al, interprets their results to mean that critical habitat moves species from a stable to an improving trend. Other factors, such as time of listing and recovery plans, move species from a declining to a stable trend. After the species has become stabilized, critical habitat is important because it allows the species to increase in numbers and expand its habitat. These are important steps in a species recovery and, eventually, it's delisting from the ESA. This is in contrast to the Rachlinski study where critical habitat was found to move species from "declining" to "stable" (Rachlinski, 1997). The reason for the difference in results is likely due to the different statistical analyses used and the different

progress reports used. Despite this difference, both studies indicate that critical habitat does indeed have benefits. These analyses indicate that the FWS is mistaken when it claims that critical habitat provides little or no additional benefit.

Based upon the fact that the FWS admits to educational and administrative benefits and the two analyses that indicate that there are conservation benefits, there do seem to be benefits of critical habitat. It gives important information to local residents, protects habitat that could be needed for recovery of a species, and helps the recovery of the species. Because of these benefits, in most cases, critical habitat should be designated for all species. While it is possible for the economic costs of critical habitat designation to outweigh the benefits of critical habitat designation, this scenario is likely quite rare. The ESA is designed to “provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved” (16 U.S.C. 1531(b)). Critical habitat can be an important step in this process and, therefore, should to be designated.

### **Type of Economic Analysis**

The next important question is: what kind of economic analysis should be used? What does it mean that the Secretary of the FWS “may exclude any area from critical habitat if he determines that the benefits of such exclusion outweigh the benefits of specifying such area as part of

the critical habitat" (16 U.S.C §1533(b)(2))? While the FWS has interpreted this to mean a CBA, what they really have been doing are cost analyses. They usually do not make much of an attempt to quantify the benefits, or even discuss the benefits. This FWS interpretation, if continued, can possibly lead to less critical habitat being designated than is optimal. Because the benefits are not formally incorporated into the analysis, it is increasingly likely that the Secretary will determine that the costs will outweigh the benefits, which can possibly justify the exclusion of many areas. In fact, this has already begun to happen. In a recent critical habitat designation for vernal pool species in California and Oregon, the FWS excluded a number of counties from the designation because they ruled that the economic costs would be too excessive (USFWS(c), 2003). It is possible that, if the benefits were quantified and included in the analysis, these counties would not have been excluded.

An interpretation of what the economic analysis should be has been offered by Sinden (forthcoming). She argues for a "short-cut" analysis that gives some consideration to cost and benefits but does not require the substantial resources of a complete CBA. While this appears to be exactly what the FWS currently is doing, Sinden is arguing preemptively for a basic analysis, rather than a formal CBA. She sees the current litigious situation driving the FWS to a more complete, formalized economic analysis. She attempts to argue that this is contrary to the



intentions of Congress and that critical habitat should not be determined by simple numbers. In addition, her analysis would likely include a more impartial discussion of costs and benefits.

Sinden lists numerous problems with the current economic analysis performed by the FWS. She argues that the FWS' current method for quantifying costs "clearly involve[s] innumerable layers of simplifying assumptions, each of which is highly vulnerable to attack." This leads to the current litigious state of affairs. In addition, CBA tries to measure vastly different values by a single metric, the dollar. For instance, it tries to measure lost profits to a project developer and the existence or intrinsic value of a species with the same measure. Further, Sinden argues that the analysis corrupts the democratic process. Because the CBA gives a single number, or a range of numbers, this might give it "a false patina of scientific certainty." This "false patina" can shift the discussion from a value discussion where the local community feels free to participate to a "scientific calculus" where only experts have the requisite knowledge. This shift can disenfranchise the local population and undermine the local support needed for resourceful recovery.

Sinden argues that in the 1970's, when the ESA was written, Congress regularly eschewed formal CBA in favor of less formal analyses, because it was highly skeptical about formal CBA (Sinden). Instead of these formal analyses, Congress used other regulatory mechanisms, such

as feasibility standards. These standards, such as the “Best Available Technology (BAT)” standard under the Clean Water Act, operate under the assumption that the benefits gained will outweigh the costs. Therefore, there is no reason to waste valuable resources to justify the action. In the 1970’s and 1980’s these feasibility standards were challenged by industry (Sinden). They argued that these standards implicitly require a CBA. However, the D.C. Circuit rejected the argument, “holding that Congress had consciously chosen a short-cut standard in order to avoid miring the agency in time consuming and costly studies that were unlikely to yield conclusive results anyway” (Sinden). The Supreme Court supported this decision, showing a “general presumption disfavoring cost-benefits analysis” (Sinden). Based upon these facts, Sinden argues that “Congress did not intend to compel the agencies to conduct formal economic cost-benefit analyses in connect with critical habitat designation” (Sinden). She states,

“any attempt to apply formal economic cost-benefit analysis to critical habitat designations will illogically force incommensurable values into a common metric, will be hopelessly indeterminate, will undermine the democratic process, and will divert precious resources from the real business of protecting imperiled species” (Sinden, forthcoming).

However, while Sinden offers a very insightful solution to the current litigious situation, her solution, a rough “apples-to-oranges” comparison, is probably not politically feasible. There is not enough political will to make

such a dramatic change in the ESA. The ESA was last reauthorized in 1992 (Hodge, 1997). The reason for this stagnation is that no political or interest group has enough political power to effect their changes. Due to the large numbers of diverse groups wanting to alter the ESA, the final outcome of an ESA revision is uncertain. Because of this uncertainty surrounding the outcome of a challenge to the ESA, no group will challenge the current manifestation.

Sinden's argument for a less formal analysis requires not only a major philosophical shift in the way the FWS implements the ESA but also would require a major revision of the ESA. If the ESA was not revised, then different interests will sue, arguing that their interests were not adequately represented in the economic analysis. Sinden herself recognizes this. She states,

"though it (the FWS) may start by performing rough apples-to-oranges comparisons in order to avoid quantifying benefits, a determination to either exclude or not exclude based on such an analysis will inevitably lead the disappointed constituency to sue claiming that benefits should have been quantified to ensure an objective and accurate cost-benefit analysis."

Her solution to this problem is for the FWS to "take a stand in favor of a 'short-cut' approach ... and unless it is backed up by the courts, this political dynamic will lead ineluctably to a more and more quantitative, complicated, and costly analysis." Unfortunately, as mentioned above, there is not the political will to fulfill her strategy.

An alternative to Sinden's "short-cut" approach is the polar opposite: an analysis that makes every attempt to quantify costs and benefits. This analysis would be similar to the CBA performed by the FWS; the major difference being that benefits are quantified to the extent possible. It is very important that both costs and benefits are quantified to the extent possible. As Sinden states, a "comparison that expresses costs in terms of dollars and benefits in quantitative terms will inevitably privilege cost over benefits and thereby skew public debate" (Sinden, forthcoming). Another reason for quantifying benefits to the extent possible is because only the numbers of the economic analysis are published in the Federal Register. When the proposed critical habitat rule is published in the Federal Register, only the numerical results are included. The unquantified benefits are not included. This will also skew public opinion because the public only sees the costs and not the benefits.

### **Economic Impacts of Critical Habitat**

It is important to note that the benefits that are included in the economic analysis are different than the benefits of critical habitat designation. The benefits of critical habitat designation accrue to the listed species. When critical habitat is designated, the species get the educational, administrative, and conservation benefits discussed above. The benefits that are analyzed in the economic analysis are economic benefits to society. These benefits include avoided loss of the species

existence value, potentially higher land values, and avoided loss of ecosystem services.

As discussed earlier, the FWS is very good at quantifying the costs of critical habitat. These costs usually center on lost development opportunities, modifications of proposed projects, and federal consultations. Therefore, the following discussion will center on economic benefits of critical habitat designation and quantification methods.

There are a number of economic benefits of critical habitat. Most of these benefits can fit into one of three value categories. These are use value, option value, and non-use value (Tietenberg, 2003). Use value “reflects the direct use of the environmental resource” (Tietenberg, 2003, 37). Examples include timber harvesting for a forest, using water from a river for irrigation, and recreation from a forest. Option value is the “value people place on having the option to use a resource in the future” (Tietenberg, 2003, 615). An example is preserving a forest for future uses, such as recreation or timber. Non-use, or passive use values are “resource values that arise from motivations other than personal use” (Tietenberg, 2003, 614). The most used example of a non-use value is existence value. This is the value that a person has for something just for knowing it exists. For example, many people value the arctic caribou even though they never plan to go the Arctic National Wildlife Refuge (ANWR).

There are many use values associated with land designated as critical habitat. When these are interpreted by economists, some of these are costs and some are benefits. For example, land prices could decrease because of a hypothetical stigma attached to critical habitat. Or it is possible that, if the land already has land restriction present, land prices will increase because the preservation of habitat improves the quality of the surrounding land. This change in value would depend on the specific context.

Examples of a use value that will always be a cost are the transaction costs associated with critical habitat. These are the consultations the federal agencies must engage in in order to avoid harm to the species or its habitat. As the FWS has demonstrated in the economic analyses, these can be substantial. For example, Industrial Economics estimated the total consultation costs for the cactus ferruginous pygmy-owl to be \$13.7 million (2002).

An example of a use value that will be a benefit is the reduced possibility of extinction of the protected species. This could increase local recreation, such as birdwatching or wildlife watching, which would help the local economy. These use values are fairly easy to determine based on standard economic methods. Once the different uses of the land are chosen, the effect on the local, regional, and, in some cases, national economies can be simulated by economists. It should be recognized that

numbers attached to the measurement of these values can be substantial. For example, Kiker et al estimated an “annual net benefit accruing...from rural natural lands [in Northeast Florida] of \$1.5 billion” (2003, 2). These benefits arose from both production activities, like timber, and from amenity values, like recreation.

These use values can be seen as actual changes in the economy, such as decreased timber sales or increased recreational opportunities. These values can be measured directly. Other use values can be estimated by using the travel cost method (TCM) or the hedonic property method. TCM is used to measure use values by measuring how much people pay to travel to a site. This travel cost is seen as a way to measure the value of the use of a natural resource. TCM is used mainly for recreational values (Tietenberg, 2003).

The hedonic property method is “a valuation technique that allows the value of an environmental amenity to be determined from differences in the values of property exposed to different levels of the amenity” (Tietenberg, 2003, 611). The hedonic property method uses regression techniques to try to separate the effect that the target resource has on the property. For example, property values change in relation to the distance from a lake. The regression can isolate this effect by controlling all other variables.

It should be noted that there are many types of use values that can be benefits of critical habitat. Recreation could increase because of the preservation of natural lands, ecosystem services could be maintained because of less development, and activities such as environmental damaging timber harvesting and grazing on public lands could be curtailed. All of these different benefits need to be considered and incorporated into the analysis.

Option value and non-use values are more difficult to analyze. There is currently only one method for quantifying non-use values. This is the contingent valuation method (CVM). This is sophisticated survey that attempts to elicit people's willingness-to-pay (WTP) for the target resource. It can be used to determine an individual's WTP for the existence of the target resource. After getting different individual's WTP for the value, it is possible to aggregate and get a total non-use value for the resource.

While it is theoretically possible to use the CVM to quantify this non-use value, there are numerous critiques of the CVM. Some of these critiques are strategic bias, information bias, and hypothetical bias (Tietenberg, 2003). Strategic bias is when a respondent knowingly gives a wrong answer in order to influence the outcome. People can over- or underestimate their value in order to change the final policy choice. Information bias can occur when people are forced to give values for a resource that they do not have experience with. For example, if people



do not know anything about a particular species, then the value obtained would not be very meaningful. The final bias is hypothetical bias. Because the survey presents a hypothetical situation, some people do not give an accurate WTP. They do not take the survey seriously and give trivial answers.

Despite these critiques, the CVM is an accepted method for determining natural resource damages. It also has been used to try to quantify non-use values for native wildlife. After the Exxon Valdez oil spill, the National Oceanic and Atmospheric Administration (NOAA) organized a committee to determine the validity of the CVM (Arrow et al., 1993). This committee was composed of economic experts, including two Nobel Laureates in economics (NOAA). They determined that the CVM is a useful instrument, as long as certain precautions are taken. These include: that the CV instrument use a referendum format, that face-to-face interviews should be used (although telephone interviews are acceptable), and that there is an adequate description of the program or policy (Arrow et al. , 1993).

Unfortunately, by incorporating these precautions, individual CV studies can be very expensive. Some economists have estimated that good CV studies would cost at least a few hundred thousand dollars (Harrison, 1996). Because of this, it could impractical for the FWS to conduct a CV study for every possible critical habitat designation.

Fortunately, numerous CV studies have already been conducted on different species and there is a method for using values for existing studies and applying it to other endangered species, which is known as the benefits transfer method.

Benefits transfer is the use of economic data obtained from one or many studies in the economic analysis for a related study (Rosenberger, 2001). The major reason for using the benefits transfer method is when the study budget is not large (King, 2003). When the study does not have enough money or time to conduct site specific analyses, the benefits transfer method can obtain an estimate of the value while being relatively inexpensive. In the case of obtaining existence values for endangered species, this means using data obtained from a study of one species and applying it to a closely related species. For example, as mentioned earlier, the FWS has attempted a benefits transfer with the pygmy owl. By using a value obtained for the Mexican spotted owl, the FWS was able to obtain a reasonable estimate of the non-use value of the Pygmy Owl (Industrial Econ., 2002).

While benefits transfer is an accepted economic practice, there are a number of conditions which accompany it. In order to get a reliable estimate, a number of requirements need to be met (Rosenberger, 2001). These include: the recipient of the transfer must be thoroughly defined so that the kind of measure, the kind of value, and the

degree of certainty regarding the transfer is well known, the study from which the values will be obtained should be based on sound economic methods, correct empirical techniques, and adequate data, and, finally, that the recipient and the “donor” should have strong correspondence (Rosenberger, 2001). Basically, this correspondence requires that the species be similar enough to validate the transfer. Therefore, using the CVM values and the benefits transfer method, it is possible to obtain a value for the non-use value for the endangered species.

Option value is the final value the needs measuring. Freeman defines option value as “the maximum willingness to pay for this contract [that eliminates supply uncertainty] on the understanding that if the option is not purchased the individual would be excluded from purchasing the good if he later demanded it” (1984, 2). Option value is what a person would pay to maintain an environmental good when there is uncertainty surrounding their demand. The individual does not want to consume the good at present but is unsure of his demand in the future. A possible method for quantifying this option value is the use of the CVM. It is possible to ask the respondents what they would pay for this option. It is also possible to use the hedonic pricing method (Kroeger, personal comm.). Because the option value can be considered a future use value, it should be possible to determine a value based on regression techniques, by controlling for other variables. By obtaining enough data

points, it would be possible to obtain a demand curve and estimate the consumer surplus. Therefore, by using acceptable economic methods and other methods like TCM, hedonic property method, and the CVM, it is possible to quantify many of the benefits of critical habitat.

### **Secondary Benefits**

The previous benefits described have all been direct benefits that arose from the protection of the species itself or its habitat. For instance, existence value of the species is directly related to the species; ecosystem function values are directly related to the habitat. In addition to these direct benefits of the species or its habitat, there are a number of “secondary benefits” that exist from the designation of critical habitat. “Secondary benefits” can be thought of as positive effects of a regulation that were not the intended results of the regulation. When designating critical habitat, the intended result is protection of the species and its habitat. However, there are a number of positive effects of this regulation. These “secondary benefits” also can be seen as correcting for a market failure. In certain situations, when there are negative externalities resulting from private actors actions, it is possible for critical habitat to correct for them. For example, when a private developer is conducting analyses to determine how land should be developed, they do not consider public positive benefits into their analyses. If critical

habitat is present, it could force the private actor to include these public benefits and, thus, correct this market failure.

A hypothetical example of a possible “secondary benefit” is when critical habitat impacts developmental patterns along the edge of metropolitan areas. If one assumes that urban sprawl is an unwanted development pattern and if critical habitat is able to stop urban sprawl, or at least cause it to become “smart growth,” then a “secondary benefit” is present. If critical habitat can prevent some of the assumed negatives of urban sprawl, such as increased traffic congestion, habitat fragmentation, and increased air pollution, then this positive benefit needs to be included in the analysis.

Another hypothetical “secondary benefit” of critical habitat is the avoided cost of community services. Many of the economic analyses conducted by the FWS have included altered developmental patterns as a cost. However, they have failed to include the avoided cost of public infrastructure. Some proposed residential developments actually cost society money (Dekel, 1997). Providing these developments with public infrastructure, such as roads, sewer, and power, costs the county more than the taxes that they receive. Therefore, if critical habitat can prevent these types of developments and avoid these community services, then that should be included in the analysis.

## Structure of Economic Analysis

The final major question is: what does the economic analysis look like? The economic analysis that the FWS have used has been CBA. Tietenberg defines CBA as “an analysis of the gains and losses of an action which attempts to quantify both the benefits and costs in order to compare them” (2003, 607). The costs of critical habitat designation are weighed against the benefits of designation. According to the FWS, “the best standard practice in economic analysis is applying an approach that measures costs, benefits, and other impacts arising from a regulatory action against a baseline scenario of the world without regulation” (Industrial Economics, 2002, Preface). However, in *NMCGA v. United States Fish and Wildlife Service*, the Tenth Circuit Court vacated this type of analysis. Therefore, the FWS developed a new CBA, with two baselines. However, this analysis not only wastes the FWS’ time, money, and effort, it is contrary to the intentions of Congress. The ESA only calls for the impacts of critical habitat to be analyzed, not the economic impacts of listing (16 U.S.C. §1533(b)(1)(A)). Therefore, the proposed methodology will be a single baseline analysis.

Shingleton argues that, in *NMCGA v. United States Fish and Wildlife Service*, the Tenth Circuit is wrong and should not have invalidated the “baseline” approach. He argues that, because Congress envisioned critical habitat providing additional benefits above those of listing, then

only those impacts should be measured, according to the ESA. He states, “if Congress intended that critical habitat provide additional protection for the species, apart from the protection provided from listing, and that only the additional protection a critical habitat designation provided was to be evaluated, then the Tenth Circuit court is incorrect” (2003, 126).

Further, he states,

“the baseline method was held invalid because no meaningful economic analysis occurred. This was not because of the baseline approach per se; rather, it was held invalid because FWS interprets the adverse modification standard as not providing additional protection from the jeopardy standard. If FWS changed its definitions, or its interpretation of them, and recognized that critical habitat designations do provide a higher standard of protection for the species, then the Tenth Circuit panels only reason for invalidating the baseline approach would disappear” (2003, 126).

Therefore, the single baseline analysis should be the economic approach used. By adding the second baseline, the FWS is simply adding more work without any benefit.

Additionally, it should be explicit that the results of the CBA will not determine whether the area is included in the critical habitat or not.

Because there is uncertainty in the numbers and ranges provided, it would be short-sighted to use the CBA as **the** decision-making tool. As Freeman states,

“it [CBA] should be considered as a framework and a set of procedures to help organize

available information. Viewed in this light, benefit-cost analysis does not dictate choices; nor does it replace the ultimate authority and responsibility of decision makers. It is simply a tool for organizing and expressing certain kinds of information on the range of alternative courses of action" (11).

The information obtained during the CBA, information that could not be incorporated into the CBA, and the final results of the CBA should all be given equal weight in the final decision. This final decision will therefore be a comprehensive one in which many values and preferences, not just economic ones, are expressed.

The final aspect of the economic analysis is that it needs to be made through a formal rulemaking process. Because Congress left much of the interpretation of the ESA to the DOI, the DOI has interpreted some of the legislative mandates contrary to Congressional intent. An example of this is "prudence." Whereas Congress intended "prudence" to be used very rarely, FWS has intentionally misinterpreted this and rarely designated critical habitat. As Houck states, "Interior's use of 'prudence' in the designation process is nothing short of remarkable" (Houck, 1993, 303). This misinterpretation has left the critical habitat process open to litigation. Conservation groups sue the FWS to either list a species or designate critical habitat while development groups sue to stop the listing or reduce the amount of critical habitat designated. This is not a constructive system for the ESA. Therefore, the methodology for conducting the economic



analyses must be made through a rulemaking process. This will give both sides an opportunity to express their concerns to the FWS about how the economic analyses are conducted. After each side expresses their concerns, a final methodology would be finalized. While this final methodology could come under legal attack, eventually, a complete methodology would be approved. This, in turn, will protect the individual economic analyses performed from litigation due to a flawed analysis method.

## Basic Methodology

This section will attempt to outline a methodology that the FWS could use when performing the economic analysis. It will rely on the assumptions and conclusions made in the previous section.

0. The first step to establish this methodology is for the FWS to develop a comprehensive list of impacts that can be applied to each and every critical habitat designation. It is important to note that they will only have to do this once, with the possibility for updates and revisions. This comprehensive list of impacts needs to be created before any specific critical habitat designations are done. These impacts will be a complete inventory of the impacts, both the costs and the benefits, associated with critical habitat designation. An example of this comprehensive list is demonstrated by Table 1. An example of an impact is a change in economic rent. This can either be a cost or a benefit or both. Depending on the situation, designating critical habitat can either raise or lower private property values. The most important aspect of this step is to make sure that it is comprehensive. It is possible, and most likely, that many of the values will be insignificant and drop out of any particular analysis. An example would be *Avoided negative externalities of urban sprawl*. If the particular critical habitat is being designated in a rural area, this impact will be insignificant and would drop out of the analysis. The FWS would

have a number of possible methods for developing this list. First, they could survey economists familiar with the ESA. Second, they could consult with interest groups who scrutinize the ESA, such as Defenders of Wildlife and the New Mexico Cattle Growers Association. Finally, they could conduct studies of recent critical habitat designations to determine what the actual affects were. By carrying out these steps, the FWS would almost guarantee themselves a comprehensive list.

Table 1*		Categories of potential economic impacts of critical habitat designation for species X: Generic template	
Value category	Potential change in value due to critical habitat designation		
	Benefits		Costs
Direct use values	<ul style="list-style-type: none"><li>Increased development opportunities for some sectors</li><li>Reduced possibility of (local) extinction of species <i>x</i> (<i>recreation, tourism - avoided loss of consumer and producer surplus</i>)</li><li>Reduced possibility of (local) extinction of other ESA species (<i>avoided loss of consumer and producer surplus</i>)</li><li>Higher economic rents <sup>1</sup></li><li>Higher land values (<i>from preservation of high environmental quality</i>) <sup>1</sup></li><li>Increased consumer surplus (<i>increased utility of critical habitat compatible recreational activities in absence of critical habitat incompatible activities with negative externalities</i>) <sup>2</sup></li><li>Increase in net social benefit from reducing baseline activities with negative net social benefits<sup>4</sup></li><li>Avoided health damages</li></ul>	<ul style="list-style-type: none"><li>Forgone development opportunities for some sectors<sup>3</sup></li><li>Lower consumer surplus (<i>due to higher prices and/or cease of critical habitat incompatible uses</i>)</li><li>Project modifications</li><li>Higher transactions costs (<i>consultations</i>)</li><li>Reduced economic rents <sup>1</sup></li><li>Reduced land/capital asset values (<i>from uncertainty, among other things</i>) <sup>3, 1</sup></li></ul>	
Non-use values	Avoided loss of stewardship, existence, and intrinsic values associated with critical habitat		
Option value	Avoided loss of non-market option values of critical habitat		
Indirect use values	Avoided loss of ecosystem function values of area designated as critical habitat <sup>5</sup>		
Avoided cost of non-smart growth	Avoided negative externalities of urban sprawl <sup>6</sup>		
Avoided cost of community services	Avoided cost of public infrastructure associated with development projects in area designated as critical habitat		

*\*Sources:* General value categories based on Barbier (2000) and Brown Jr. and Shogren (1998). Developed by Timm Kroeger at Defenders of Wildlife.

*Notes:* \* Not all benefit/cost categories are applicable in every case of critical habitat designation.

<sup>1</sup>To the extent that land is used for marketed output, land values capture economic rents, and vice versa.

<sup>2</sup>E.g.: increased enjoyment of snowshoeing or cross-country skiing without presence of snow mobiles.

<sup>3</sup>Insofar as future development opportunities are anticipated, the lost opportunities of development will be captured, at least partly, in reduced land/capital asset values.

<sup>4</sup>Example: Logging/grazing on public lands below social cost. Examples given in Rachlinski (1997) and Houck (1995).

<sup>5</sup> Includes the ecological regulatory function of the species of concern (especially important for keystone species).

<sup>6</sup>E.g., health damages from increased air pollution due to increases in private transport as a result of urban sprawl.

1. The first step for each individual analysis is to establish the spatial and temporal boundaries. It is important to make the spatial boundary decision based on only the best available scientific/ecological data for the needs of the species. These boundaries cannot take economic factors into consideration. This would echo the listing process for the species. The Act states that you can “exclude” an area. This implies that the maximum area needed for recovery, based solely on biological needs, should be designated and then, based on economic considerations, specific areas can be excluded. After the boundaries have been drawn with this ecological data, then the economic analysis can exclude specific areas if the costs are found to be too high. The temporal boundary should be ten years. This is because it is difficult to predict economic behavior beyond this point (Kroeger, personal Comm.).

2. The next step is to identify land ownership and land use/cover for the proposed critical habitat. When available, GIS should be used. A matrix is then developed based on this data. See Table 2 for an example. For each cell, the number of acres should be determined.

Table 2.		Land Use/Cover and Ownership Matrix							
		Agricultural			Mining	Non-timber forest	Developed Lands		
		Grazing	Crop	Timber			Residential/Commercial	Industrial	Infra-structure
Land Ownership	Private lands								
	Private lands with conservation easement								
	Tribal								
	Public Lands	BIA Trust							
		BLM							
		BoR							
		FS	100	1,000		1,500			
		FS-wilderness							
		FWS							
		NPS							
		State parks							
		Other State Lands							

3. The third step is to develop the economic baseline. In order to do this, it is necessary to determine the existing management of the proposed lands and activities. Examples of this management would be National Forest Plans, Fire Management Plans, and local and state land use plans. The known activities' intensity is recorded and entered into the matrix. For example, it could be determined that there is low intensity grazing on 100 acres, high intensity timbering on 1,000 acres, and low intensity camping on 1,500 acres of FS land (see Table 2).

4. In order to lessen the analysis load, one can combine similar cells in the matrix. For instance, if there is low intensity grazing occurring on BLM, FS, and BoR land, then it is possible to combine them into one cell. This becomes the Land Use Type, like federal low intensity grazing. It is important that when cells are combined, they have to have similar management. If similar uses on federal lands have different management plans, then they should not be combined.

5. The fifth step is to determine what changes in management will need to be made in response to critical habitat designation. For example, grazing must be eliminated, timber harvests reduced by half, and no change with respect to low intensity camping. This is the most important step in the process. This will determine the economic effects of critical habitat designation. Therefore, it is imperative that experts familiar with the species/ecosystems/activities determine what changes will be



made. The second important aspect of this step is to attempt to identify what economic impacts are due exclusively to critical habitat designation. While it can be difficult to separate the effects of listing from those of critical habitat designation, it is necessary to separate them so the economic analysis will not be biased.

6. The final step will be to determine the cost and benefits of each change in management based upon the comprehensive list of impacts. For example, if grazing is eliminated, it will have a number of different impacts. It might reduce economic rents because the landowner is not compensated for the eliminated grazing. It also might increase rents due to an increase in camping. Most campers do not enjoy camping with cattle, so eliminating grazing is likely to increase camping. When possible, these values should be quantified, per acre. In the previous example, it is possible to determine the loss, and gain, in rents due to the elimination of grazing. However, it will be necessary to critique the methods fully. For example, while it is possible to use contingent valuation or benefits transfer to get a value for existence value for species, the limitations and uncertainties should be recognized and explicit. When it is not possible to quantify the impacts, these values should be explained fully. Just because these values cannot be quantified, this does not mean that they are not important. An example of these unquantifiable impacts could be the loss/gain in ecosystem services. It is possible that many of the impacts

will go unquantified due to the limited budgets of the Service and the large number of listing/critical habitat proposals outstanding. However, as mentioned earlier, these unquantified impacts needs to be included in the Federal Register. This will lead to more explicitly balanced decisions being made.

## Conclusions

The Endangered Species Act is a vital component of the United States set of environmental laws. It is the most comprehensive law in existence for the preservation of species, designed to not only protect the species itself but also the habitat upon which it depends. The ESA forces the FWS and the NMFS to list endangered species, designate critical habitat, and implement recovery plans. After the species has become listed, the ESA protects these species from "harm" by the use of federal consultations, project modifications, and prohibitions on "take." The ESA not only protects the species but it plans for the recovery and eventually delisting of the species. Recovery plans are intended to facilitate improvement of the species. They are plans that should set certain target goals for the federal agencies. While there is controversy surrounding these plans, they can be vital for the recovery of the species.

Critical habitat is another important aspect of the ESA. It protects the habitat upon which the species depends. There has been much controversy on the historic implementation. Traditionally, the FWS has declined to designate critical habitat because they feel that critical habitat provides no real conservation benefit above simply listing the species. In order to justify not designating critical habitat, the FWS claimed that it would not be "prudent." Fortunately, recent lawsuits have

found that rationale to be unlawful (NRDC, 1997). Now, the FWS must designate critical habitat according to the timetable that is given them.

Unfortunately, a new controversy has recently appeared. When designating critical habitat, the FWS must consider economic factors. Therefore, they conduct an economic analysis whenever they propose to designate critical habitat. Originally, because the FWS saw no additional benefit of critical habitat, they also argued that there were no economic affects above those of listing. This strategy has recently been held to be in violation of the ESA by the Tenth Circuit in NMCGA. Now, the FWS is conducting economic analyses that attempt to examine the costs and benefits of critical habitat designation. Unfortunately, what is actually happening is that the costs of critical habitat designation, generally consultation costs and project modifications, are being quantified while the benefits of critical habitat, like avoided loss of ecosystem services, avoided loss of existence values, and potentially higher land values, are not being quantified. This results in a skewed CBA (Sinden, forthcoming). Because only the numbers from the CBA, which are the quantified costs, are published in the Federal Register, this can bias public opinion. The unquantified benefits are not published and therefore not seen by the general public. Therefore, what is needed is a methodology that can quantify the costs **and** benefits of critical habitat. While it will be difficult, if not impossible, to quantify all of the benefits of critical habitat

designation, an attempt should be made to quantify as many as possible. For example, it is possible to estimate the existence value of species through the use of CVM. It is also possible to estimate the change in land values (which may be positive or negative). Therefore, these should be quantified and weighed against the quantified costs.

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